

General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.
- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.
- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.
- This document is paginated as submitted by the original source.
- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

NASA CR-
14455-3
ECC-69971

121.75 MHz BAND PASS FILTER

Job Order 17-060

(NASA-CR-144553) THE 121.75 MHz BAND PASS
FILTER (Lockheed Electronics Co.) 14 p
HC \$3.50 CSCL 09C

N76-11349

Unclassified
G3/33 02603

Prepared By

Lockheed Electronics Company, Inc.

Aerospace Systems Division

Houston, Texas

Contract NAS 9-12200

For

SPACECRAFT SYSTEMS TEST OFFICE

TRACKING AND COMMUNICATIONS DEVELOPMENT DIVISION



National Aeronautics and Space Administration
LYNDON B. JOHNSON SPACE CENTER

Houston, Texas

September 1975

LEC-6995
Shuttle

121.75 MHZ BAND PASS FILTER

Job Order 17-060

PREPARED BY


R. J. Davis, Project Engineer
Lockheed Electronics Company, Inc.

APPROVED BY

LEC

A. L. Roelse, Supervisor
Spacecraft Systems Test
Section

NASA

William C. Long, Head
Spacecraft Systems Test
Office


J. S. Creamer, Jr., Manager
Tracking and Communications
Systems Department

Prepared By
Lockheed Electronics Company, Inc.
For
Spacecraft Systems Test Office
Tracking and Communications Development Division

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
HOUSTON, TEXAS

September 1975

PREFACE

This report describes the results of tests performed on a 121.75 MHz band pass filter. It is the filter recommended in LEC document 4457 as a solution for the rejection of an interfering signal at 142.417 MHz.

ACKNOWLEDGEMENTS

This document was prepared in response to Action Document 7060-21-60, submitted by the Spacecraft Systems Test Office (SSTO) of the Tracking and Communications Development Division. William C. Long, Office Head, was the Technical Monitor for this task. Robert J. Davis, of the Spacecraft Systems Test Section, Lockheed Electronics Company, Inc., prepared this document.

CONTENTS

Section	Page
1. SUMMARY	1-1
2. 121.75 MHz BANDPASS FILTER TEST REPORT.	2-1
3. CONCLUSIONS	3-1

1. SUMMARY

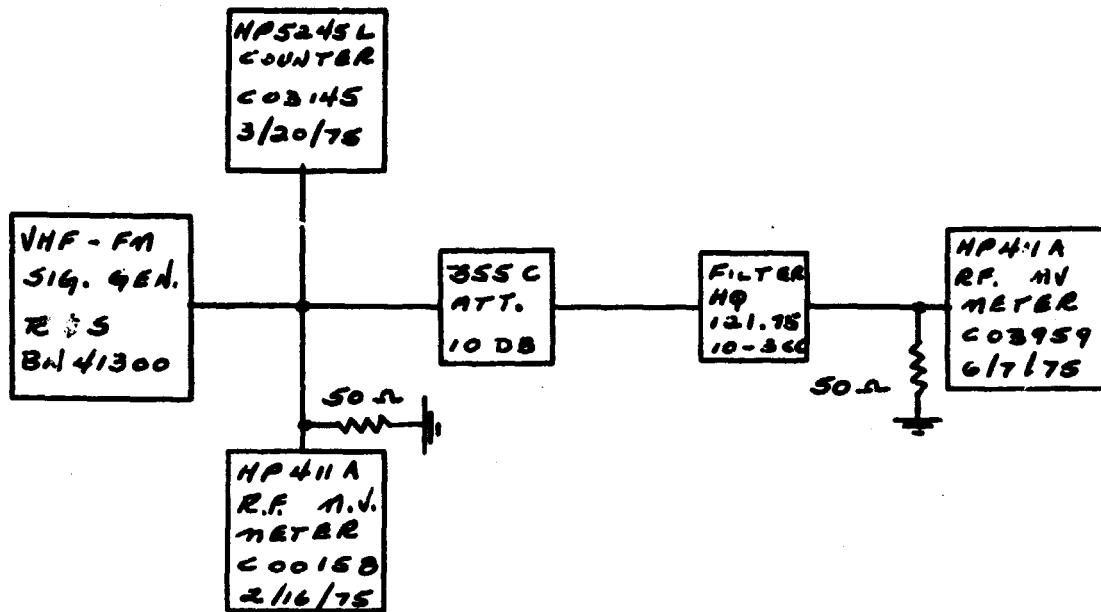
Prior to the ASTP joint flight it had been observed during various tests on the USA's VHF/FM system, that the 121.75 MHz receiver unsquelched when exposed to certain rf power levels at a frequency of 142.417 MHz. Consequently, tests were conducted per LEC Document 4457 in an effort to arrive at a solution. Several recommendations were made but the most feasible was to insert a selective band pass filter in the transmit/receive line of the VHF/FM transceiver. The tests shown in Section 2 were performed on the filter to determine the frequency response and rejection capabilities at 142.417 MHz.

2. 121.75 MHz BANDPASS FILTER TEST REPORT

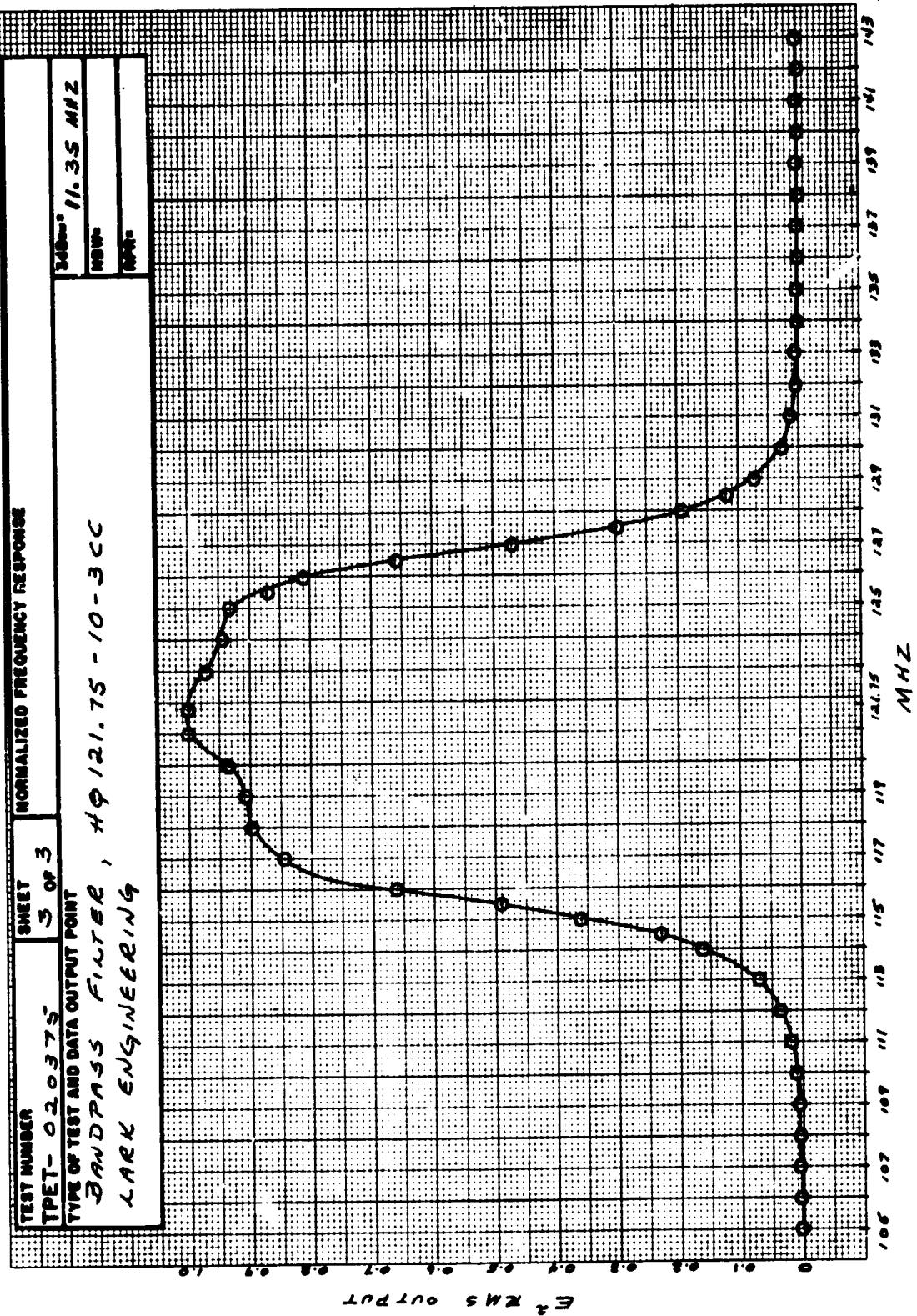
The test results are shown on the following pages of this section. Ran band pass characteristics of the filter per set up on page 2-2 with resulting data plot on page 2-4.

Also conducted a test with the filter connected in the planned flight position as shown on page 2-8. The resulting plot of unsquelched levels vs frequency shows the rejection capability at 142.417 MHz.

		PAGE NO.	
TEST NUMBER 020375	SHEET 1 OF 3	TEST PROCEDURE NO. PROCEDURE SECTION NO.	
RECORDED BY <i>R. Dennis</i>	TYPE OF TEST AND DATA OUTPUT POINT BANDPASS FILTER HQ 131.75-10-366		
APPROVED BY	LARK ENGINEERING		



						PAGE NO.		
TEST NUMBER 020375			SHEET 2 OF 3	TEST PROCEDURE NO. PROCEDURE SECTION NO.				
RECORDED BY <i>R. Lewis</i>			TYPE OF TEST FREQUENCY RESPONSE BANDPASS FILTER HQ121.75-10-3CC LARK ENGINEERING					
FREQ. M Hz	E OUTPUT RMS MV	E ² NORM.	FREQ. M Hz	E OUTPUT RMS MV	E ² NORM.	FREQ. M Hz	E OUTPUT RMS MV	E ² NORM.
105	5.4	.001	125	145	.934	143	1.3	.0000
106	6.4	.002	126	135	.810	125.5	140	.871
107	7.6	.003	126.5	122	.661			
108	9.5	.004	127	103	.471			
109	12	.006	127.5	83	.306			
110	15.5	.011	128	66	.194			
111	20.5	.019	128.5	52	.120			
112	28	.035	129	41	.075			
113	40	.071	129.5					
113.5	48	.102	130	26	.030			
114	60	.160	130.5					
114.5	72	.230	131	18	.014			
115	90	.360	132	13	.007			
115.5	105	.490	133	9.5	.004			
116	122	.661	134	7.5	.0025			
117	138	.846	135	5.5	.0013			
118	142	.896	136	4.5	.0009			
119	143	.908	137	3.7	.0006			
120	145	.934	138	3.0	.0004			
121	150	1	139	2.5	.0003			
121.75	150	1	140	2.1	.0002			
123	148	.973	141	1.7	.0001			
124	146	.947	142	1.5	.0001			
REMARKS: INSERTION LOSS OF FILTER = 0.7 DB								

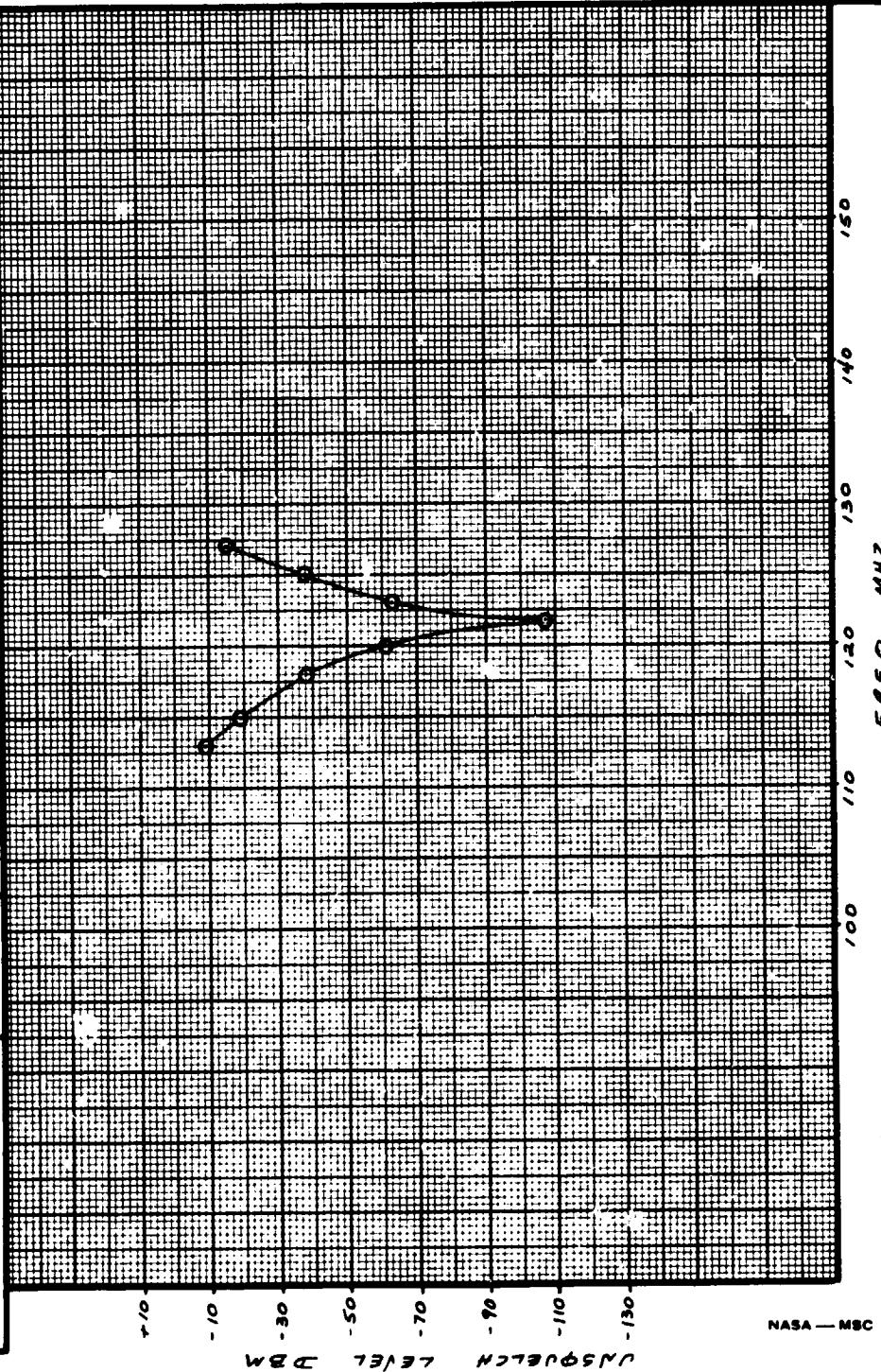


			PAGE NO
TEST NUMBER 020675-1	SHEET 1 OF 4	TEST PROCEDURE NO. PROCEDURE SECTION NO. AD # 7060-21-60	
RECORDED BY <i>L. Davis</i>	TYPE OF TEST AND DATA OUTPUT POINT VHF/FM TRANSCEIVER SIGNAL TEST WITH FILTER		
FREQ. MHz	SQUELCH LEVEL DBM	UNSQUELCH LEVEL DBM	FILTER IN
113	-11	-10	NO
113	-9.7	-8.7	YES
115	-21	-20	NO
115	-19.7	-18.7	YES
118	-39	-38	NO
118	-38.7	-37.7	YES
120	-62	-61	NO
120	-61.7	-60.7	YES
121.750	-108	-107	NO
121.750	-107.7	-106.7	YES
123	-63	-62	NO
123	-63.7	-62.7	YES
125	-39	-38	NO
125	-38.7	-37.7	YES
127	-21	-20	NO
127	-15.7	-14.7	YES
130	0	+1	NO
130		NO UNSQUELCH	YES
131	+12	+11	NO
131		NO UNSQUELCH	YES
132	+2	+3	NO
132		NO UNSQUELCH	YES
REMARKS: ① VHF/FM XMTR DEVIATED 10 KHZ WITH 1 KHZ SINE WAVE ② RF POWER INSERTED AT J4 OF VHF/FM RCVR.			

			PAGE NO
TEST NUMBER 020675-1	SPHET 2 OF 4	TEST PROCEDURE NO. PROCEDURE SECTION NO. AD # 7060-21-60	
RECORDED BY <i>R. J. Davis</i>	TYPE OF TEST AND DATA OUTPUT POINT VHF/FM TRANSCEIVER SIGNAL TEST WITH FILTER		
APPROVED BY			
FREQ. MHz	SQUELCH LEVEL dBm	UNSQUELCH LEVEL dBm	FILTER IN
141	+ 3	+ 4	No
141		No UNSQUELCH	YES
141.500	- 3	- 2	No
141.500		No UNSQUELCH	YES
142	- 5	- 4	No
142		No UNSQUELCH	YES
142.417	- 5	- 4	No
142.417		No UNSQUELCH	YES
142.800		No UNSQUELCH	No
142.800		No UNSQUELCH	YES
143		No UNSQUELCH	No
143		No UNSQUELCH	YES
143.140	- 41	- 40	No
143.140		No UNSQUELCH	YES
143.150	- 44	- 43	No
143.150	+ 0.7	+ 1.7	YES
143.183	- 39	- 38	No
143.183		No UNSQUELCH	YES
143.190	- 27	- 26	No
143.190	- 7.7	- 6.7	YES
REMARKS:			

TEST NUMBER
TPET-020675-1

SWEET
VHF/CM TRANSCIEVER SIGNAL TEST WITH FILTER
3 OR 4
AD# 7000-21-60



NASA — MSC

LEO FORM 96 (REV 10)

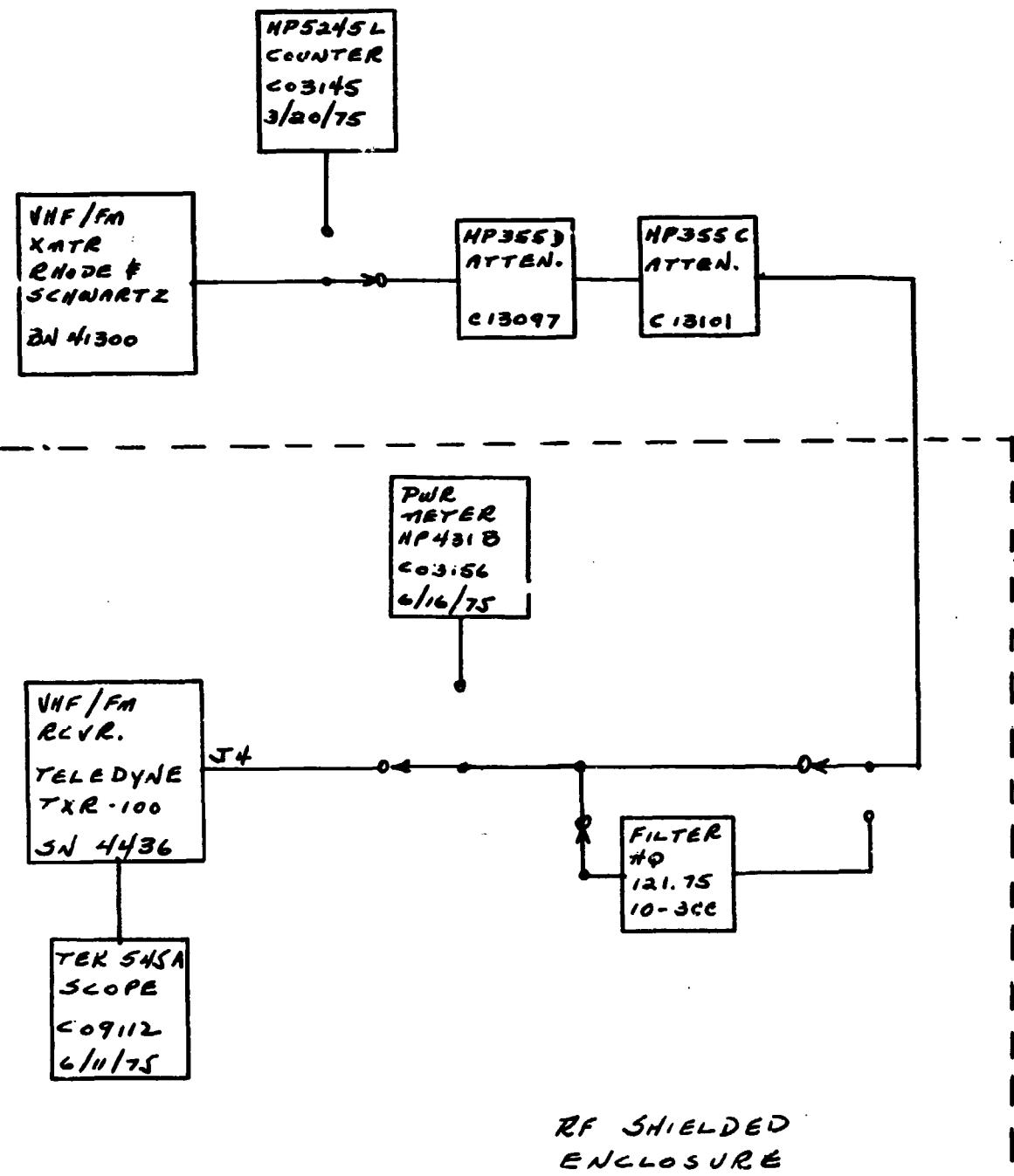
PAGE NO.

TEST NUMBER
020675-1
RECORDED BY
L. Davis
APPROVED BY

SHEET
4 OF 4
TYPE OF TEST AND DATA OUTPUT POINT

TEST PROCEDURE NO. AD#7060-21-60

PROCEDURE SECTION NO.

VHF/FM TRANSCEIVER SIGNAL
TEST WITH FILTER

3. CONCLUSIONS

The frequency response of the filter shows it to have a 3 dB bandwidth of 11.35 MHz or \pm 5.675 MHz about a center frequency of 121.75 MHz. It also shows the interfering frequency, 142.417 MHz, to be well out of the band pass region.

Unsquench tests were also conducted and the rejection capabilities were more than adequate, especially at the interfering frequency of 142.417 MHz.